

CLAIM AMENDMENTS

This listing of claims will replace all prior versions and listings of claims in the application.

1 1. (Currently Amended) A method of emulating Virtual Provide Local Area
2 Network Service (VPLS) in an Asynchronous Transfer Mode (ATM) network,
3 comprising the following steps:

4 configuring, at a plurality of provider edge devices (PEs) arranged in a
5 Private Network-Network Interface (PNNI) hierarchy, a VPLS having a VPLS
6 Identifier (ID);

7 at each PE, generating a PNNI Topology State Element (PTSE) including a
8 VPLS Information Group (IG), the VPLS IG indicating the VPLS ID and an ATM
9 address associated with the VPLS;

10 flooding each VPLS IG throughout the PNNI hierarchy to exchange
11 information between the PEs;

12 ~~exchanging information between the PEs indicating a respective ATM~~
13 ~~address at each PE which is associated with the VPLS;~~

14 establishing a mesh of virtual circuits in the ATM network to emulate VPLS
15 by attaching virtual circuits to pairs of PEs, each of the pairs of PEs in the mesh
16 comprising a first PE and a second PE, wherein establishing each virtual circuit
17 between the first PE and the second PE comprises:

18 selecting ~~a~~the first PE and ~~a~~the second PE for ~~a~~the virtual circuit
19 when the first PE determines that the second PE supports the VPLS ID;
20 determining whether the first PE or the second PE should initiate the
21 virtual circuit; ~~and~~
22 automatically establishing ~~a~~respectivethe virtual circuit between the
23 ~~pair of PEs~~first PE and the second PE using the respective ATM address of
24 each PE as endpoints of the virtual circuit, wherein the virtual circuit has a
25 traffic characteristic equal to a minimum traffic characteristic of the first PE
26 and the second PE.

1 2. (Original) The method of claim 1 wherein at each PE, the respective ATM
2 address associated with the VPLS is unique to the VPLS.

1 3. (Currently Amended) The method of claim 1, wherein a second VPLS is
2 emulated at a plurality of the PEs, and wherein at each such PE the respective
3 ATM address associated with the VPLS is also associated with the second VPLS.

1 4. (Canceled)

1 5. (Currently Amended) The method of ~~claim 4~~claim 1, further comprising:

~~wherein the step of flooding each VPLS IG throughout the PNNI hierarchy
comprises the steps of:~~

at each PE, flooding the PTSE throughout a peer group of the PE, each peer group having a peer group leader;

at each peer group leader, receiving each PTSE generated by a PE within the peer group of the peer group leader and flooding such PTSEs throughout a parent logical group of the peer group leader;

at each peer group leader, receiving at least one other PTSE, each other PTSE containing a VPLS IG indicating an association between the VPLS ID and an ATM address, from the parent logical group of the peer group leader; and

at each peer group leader, flooding the at least one other PTSE throughout the peer group of the peer group leader.

6. (Currently Amended) A method of emulating Virtual Provide Local Area Network Service (VPLS) in an Asynchronous Transfer Mode (ATM) network, comprising the following steps:

configuring, at a plurality of provider edge devices (PEs), arranged in a Private Network-Network Interface (PNNI) hierarchy, a VPLS having a VPLS Identifier (ID);

associating an ATM address with the VPLS ID;

8 at each PE, generating a Private Network-Network Interface (PNNI) ~~PNNI~~
9 Augmented Routing (PAR) Service IG including the VPLS ID, an ATM address ~~to be~~
10 associated with the VPLS, and a traffic characteristic associated with both the
11 VPLS ID and the ATM address;

12 advertising the association between the VPLS ID and the ATM address to
13 other nodes within the ATM network;

14 flooding each PAR Service IG throughout the ATM network;

15 establishing a mesh of virtual circuits in the ATM network to emulate VPLS
16 by attaching virtual circuits to pairs of PEs, each of the pairs of PEs in the mesh
17 comprising a first PE and a second PE, wherein establishing each virtual circuit
18 between the first PE and the second PE comprises:

19 selecting ~~a~~ the first PE and ~~a~~ the second PE for ~~a~~ the virtual circuit
20 when the first PE determines that the second PE supports the VPLS ID;

21 determining whether the first PE or the second PE should initiate the
22 virtual circuit;

23 determining other ATM addresses within the ATM network which are
24 associated with the VPLS;

25 for each such other ATM address, determining whether the PE is to set
26 up a virtual circuit with the ATM address; and

27 | automatically establishing a ~~respective~~ the virtual circuit between the
28 | ~~pair of PEs~~ first PE and the second PE using the respective ATM address of
29 | ~~each PE~~ the first PE and the second PE as endpoints of the virtual circuit,
30 | wherein the virtual circuit comprises a traffic characteristic equal to the
31 | minimum traffic characteristic of the ~~pair of PEs~~ first PE and the second PE.

1 | 7. (Currently Amended) The method of claim 6, wherein at least one other PE
2 | uses Proxy PAR to exchange with PEs ATM addresses to be associated with the
3 | VPLS.

1 | 8. (Currently Amended) The method of claim 7, wherein the at least one other
2 | PE is attached to the ATM network via an ATM link employing an ATM User
3 | Network Interface (UNI) signaling protocol.

1 | 9. (Currently Amended) The method of claim 7, wherein the at least one other
2 | PE is attached to the ATM network via an ATM link employing an ATM Inter-
3 | Network Interface (AINI) signaling protocol.

1 | 10-12. (Canceled)

13. (Currently Amended) A method of emulating a Virtual Private Local Area Network Service (VPLS) at a Provider Edge device (PE) within an Asynchronous Transfer Mode (ATM) network, comprising the following steps:

configuring, at the PE, a VPLS Identifier (ID) associated with the VPLS, including associating an ATM address with the VPLS ID;

advertising the association between the VPLS ID and the ATM address to other nodes within the ATM network, including advertising at least one traffic characteristic to be associated with the VPLS ID and the ATM address;

determining other ATM addresses within the ATM network which are associated with the VPLS;

generating a PNNI Topology State Element (PTSE) including a VPLS information group (IG), the VPLS IG indicating the VPLS ID and the ATM address associated with the VPLS;

flooding the PTSE throughout the peer group of the node;

generating a Private Network-Network Interface (PNNI) Augmented Routing (PAR) Service information group (IG) including the VPLS ID and the ATM address;

flooding the PAR Service IG throughout the ATM network; and

establishing a mesh of virtual circuits in the ATM network to emulate VPLS by attaching virtual circuits to pairs of PEs, each of the pairs of PEs in the mesh

20 comprising a first PE and a second PE, wherein establishing each virtual circuit

21 between the first PE and the second PE comprises:

22 for each such other ATM address, determining whether the PE is to set
23 up ~~a~~ the virtual circuit with the ATM address;

24 selecting ~~a~~ the first PE and ~~a~~ the second PE for ~~a~~ the virtual circuit
25 when the first PE determines that the second PE supports the VPLS ID;

26 determining whether the first PE or the second PE should initiate the
27 virtual circuit; and

28 automatically establishing ~~a~~ the virtual circuit between the
29 ~~pair of PEs~~ first PE and the second PE using the respective ATM address of
30 ~~each PE~~ the first PE and the second PE as endpoints of the virtual circuit,
31 wherein the virtual circuit comprises a traffic characteristic equal to a
32 minimum of the at least one traffic characteristic and a second traffic
33 characteristic associated with the other ATM address.

1 14. (Currently Amended) The method of claim 13, further comprising:

2 ~~wherein the step of setting up a virtual circuit comprises~~

3 setting up the virtual circuit in conformance with the at least one traffic
4 characteristic.

15-16. (Canceled)

17. (Currently Amended) A node within an Asynchronous Transfer Mode (ATM) network, wherein the node is part of a Private Network-Network Interface (PNNI) hierarchy, comprising:

means for receiving a Virtual Private Local Area Network Service (VPLS) identifier (ID); and

a VPLS controller comprising a computer-readable medium encoded with instructions, the computer-readable medium comprising:

instructions for receiving a service identifier (ID) identifying a service;

instructions for generating a PNNI Topology State Element (PTSE) including a service information group (IG), the service IG indicating the service ID and an ATM address to be associated with the service;

instructions for flooding the service IG throughout the PNNI hierarchy by generating at least one message, each message containing at least two PTSEs;

~~instructions for associating an ATM address with the VPLS ID;~~

~~instructions for advertising the association between the ATM address and the VPLS ID to other nodes within the ATM network;~~

instructions for determining other ATM addresses within the ATM network which are associated with the VPLS ID;

19 instructions for, for each such other ATM address, determining whether the
20 node is to set up a virtual circuit with the other ATM address, the instructions for
21 guaranteeing that only one virtual circuit is set up between the node and the other
22 ATM address;

23 instructions for establishing a mesh of virtual circuits to emulate VPLS by
24 attaching virtual circuits to pairs of PEs, each of the pairs of PEs in the mesh
25 comprising a first PE and a second PE, wherein the instructions for establishing
26 each virtual circuit between the first PE and the second PE further comprise:

27 instructions for selecting ~~a~~ the first PE and ~~a~~ the second PE for ~~a~~ the
28 virtual circuit when the first PE determines that the second PE supports the
29 VPLS ID;

30 instructions for determining whether the first PE or the second PE
31 should initiate the virtual circuit; and

32 instructions for automatically establishing ~~a~~ respective the virtual
33 circuit between the ~~pair of PEs~~ first PE and the second PE using the
34 respective ATM address of each ~~PE~~ the first PE and the second PE as
35 endpoints of the virtual circuit.

1 18. (Canceled)

1 19. (Currently Amended) The node of claim 17, ~~wherein the node is part of a~~
2 ~~Private Network Network Interface (PNNI) hierarchy, and wherein the instructions~~
3 ~~for advertising the association between the ATM address and the VPLS ID~~
4 ~~comprise: further comprising:~~

5 instructions for generating a PNNI Augmented Routing (PAR) Service
6 information group (IG), the PAR service IG including the VPLS ID and the ATM
7 address to be associated with the VPLS; and

8 instructions for flooding the PAR service IG throughout the ATM network.

1 20. (Currently Amended) The node of claim 17, wherein the instructions for
2 advertising the association between the ATM address and the VPLS ID comprise
3 instructions for delivering the association to a second node using Proxy PAR.

1 21-22. (Canceled).